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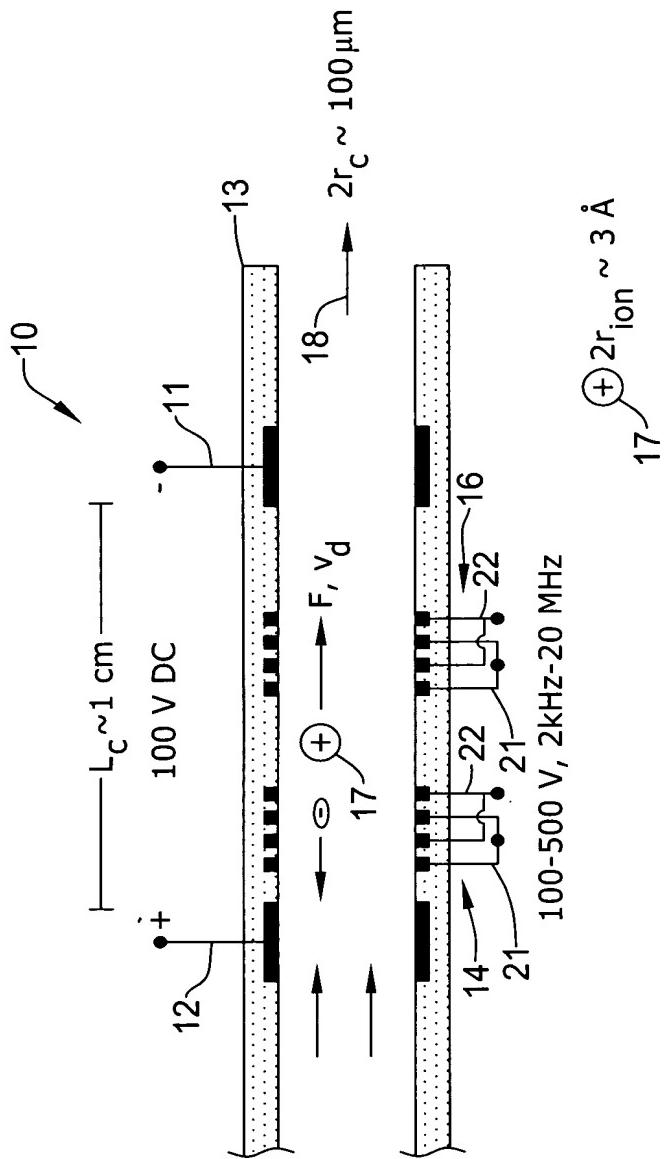


Figure 1

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Applied Pot.	v	Ion Radius, rion	Ion mol Fraction	Gas Velocities for Ls=Le	Ls	Re(Ls)	$\Delta P(Ls)$	Qohmic mW	Ion+Flow Qvisc mW	Qgen mW	Qvisc+Qgen Qtotal mW	Qideal mW
* 100				0.01	0.00	0.000010	0.0000000	1.238E-12	0.000001	1.11E-06	1.238E-12	
cm		1.000E-12	0.04	0.00	0.00	0.000031	0.0000001	1.238E-11	0.000003	3.51E-06	1.238E-11	
* 1.50E-08		3.162E-12	0.12	0.00	0.00	0.000097	0.0000002	1.238E-10	0.000011	1.11E-05	1.238E-10	
Cap.Radius, rc	cm	1.000E-11	0.37	0.01	0.001	0.000307	0.0000005	1.238E-09	0.000035	3.51E-05	1.238E-09	
cm	1.000E-10	1.18	0.02	0.002	0.00971	0.0000017	1.238E-08	0.000109	1.11E-04	1.238E-08		
* 0.005		3.162E-10	3.72	0.07	0.005	0.003072	0.0000053	1.238E-07	0.000346	3.51E-04	1.238E-07	
Field Length, Le	cm	1.000E-09	11.76	0.24	0.016	0.009715	0.0000168	1.238E-06	0.001095	1.11E-03	1.238E-06	
cm	3.162E-09	37.20	0.74	0.050	0.030721	0.0000531	1.238E-05	0.003465	3.53E-03	1.238E-05		
* 1		1.000E-08	117.62	2.35	0.159	0.097147	0.0001684	0.00012	0.010996	0.01	0.0001	
3.162E-08		371.96	7.44	0.502	0.307206	0.0005383	0.00124	0.035152	0.04	0.0012		
Tot.Cap.Length,Ls	cm	1.000E-07	1176.23	23.52	1.586	0.971472	0.0017605	0.01238	0.114973	0.13	0.0124	
cm	3.162E-07	3719.57	74.39	5.016	3.072064	0.0061508	0.12379	0.401686	0.53	0.1238		
* 50		1.000E-06	11762.30	235.25	15.863	9.714720	*0.0252860	*1.23797	1.651345	*2.91	1.2379	
q,Electronic Charge in Cb=	eV	3.162E-06	37195.66	743.91	50.163	30.720642	0.1383175	12.37871	9.033049	21.55	12.3787	
Eion, Ioniz.Energy	eV	1.000E-05	117623.02	2352.46	158.628	97.147201	1.0209592	123.78713	66.675372	191.48	123.7871	
Drift Vel. in cm/s, vd=						461.747						
NA, Avogadro Num. in 1/cm ³ =						2.8830E+19						
q,Electronic Charge in Cb=						1.6022E-19	*					

Figure 2

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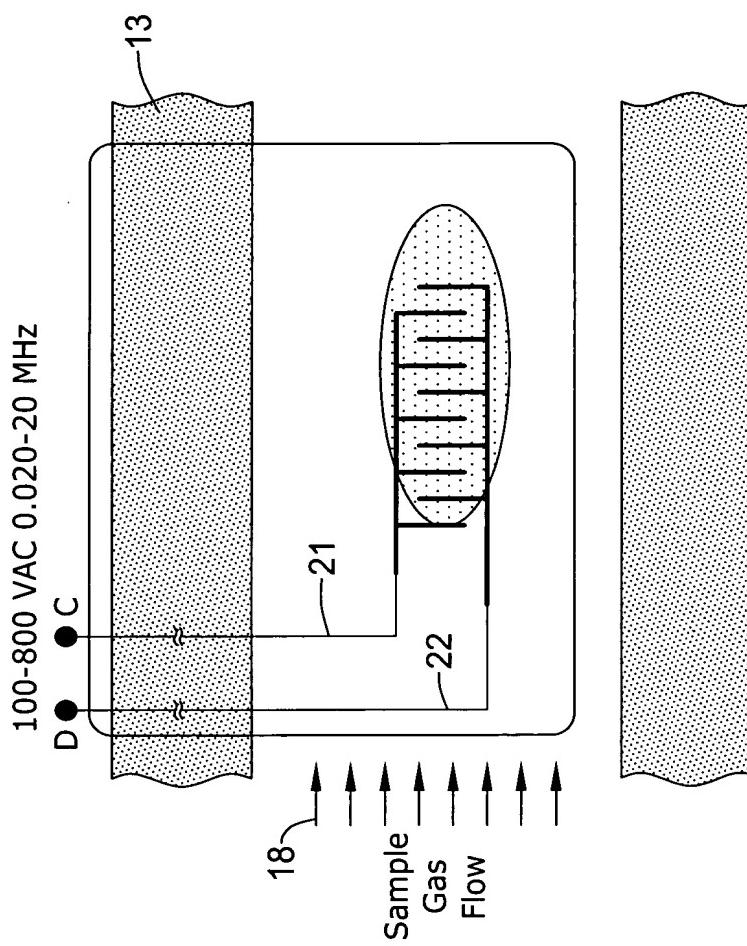


Figure 3

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Electron Affinities and Electron Configurations			
Element	Electron Affinity (kJ/mol)	Electron Configuration	Ionization Energies (kJ/mole)
H	72.8	1s ¹	1300
He	<0	1s ²	2400
Li	59.8	[He] 2s ¹	
Be	<0	[He] 2s ²	
B	27	[He] 2s ² 2p ¹	
C	122.3	[He] 2s ² 2p ²	1050
N	<0	[He] 2s ² 2p ³	
O	141.1	[He] 2s ² 2p ⁴	1300
F	328.0	[He] 2s ² 2p ⁵	
Ne	<0	[He] 2s ² 2p ⁶	

Figure 4

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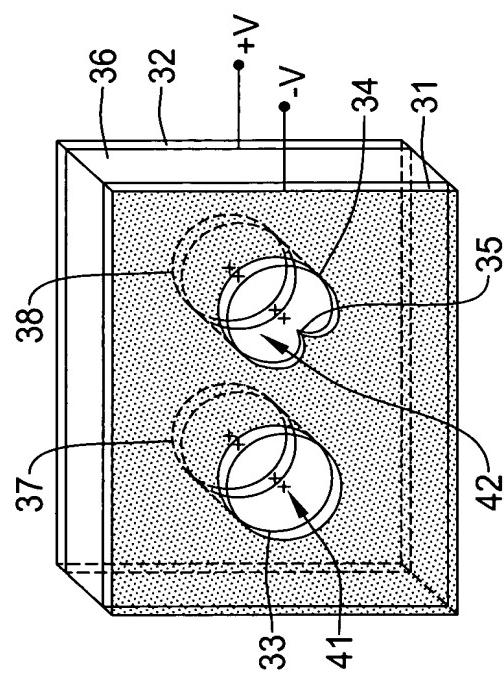


Figure 5

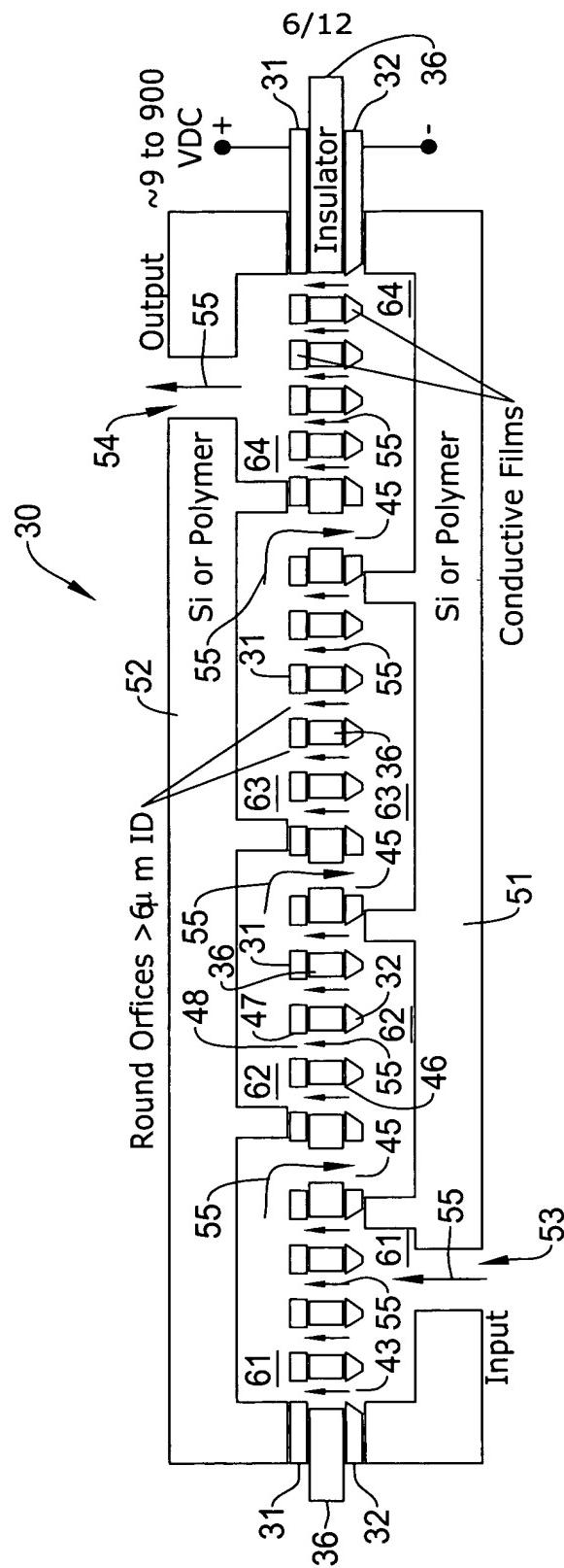


Figure 6

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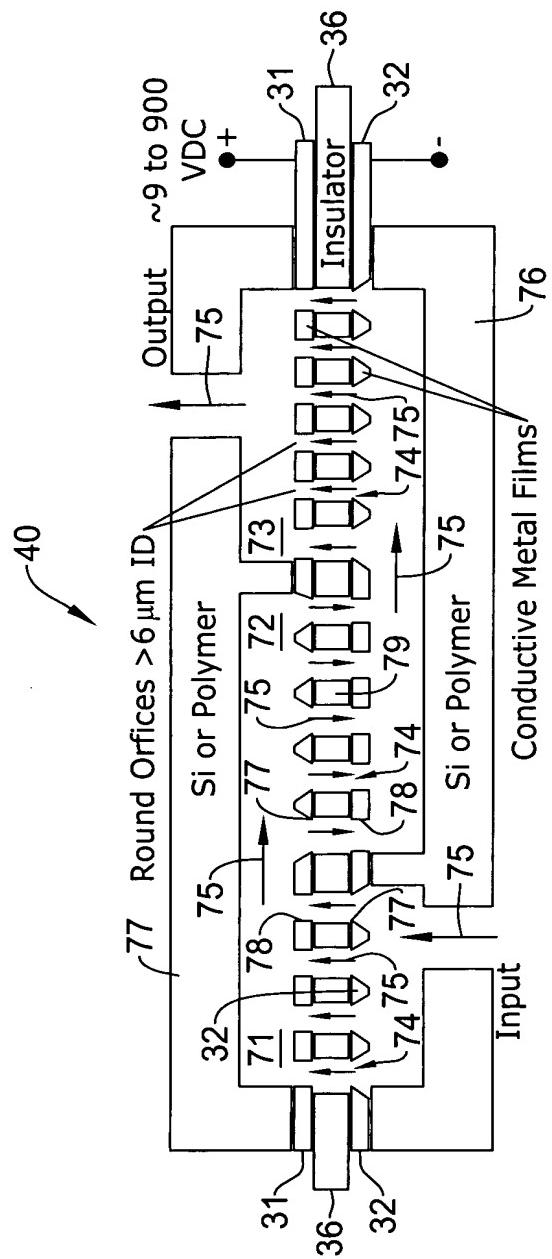


Figure 7

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Comparison of Performance Between Pumps Based on Different Technologies

Method	Base Unit Size x N mm ³	Frequency Hz	Power mW	Voltage V	Flow Rate cm ³ /min	Δp psid
Theoretical Ion Drag	10 x 0.25 x 1 = 2.5	DC DC	1.26 1.65	1.41 401.41	9.7 9.7	
MesoPump (el.-static, future)	5x5x0.5x15 = 188	25	14	100	1.0	10
MesoPump (el.-static, today)	10x10x1x50 = 5000	3	25	150	1.0	10
MesoPump (el.-static, today)	10x10x1x50 = 5000	3	25	150	1.0	10
Piezo-Electric (fraunhofer)	7x7x1.1x7x14 = 5282	100		98		

Figure 8

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Temperature Dependence of Ion Concentration

Temper. T in K	Ion Aff. Energy $E(-)$ in J/mol 100,000 $\exp(-E/RT)$	Ionizat. Energy $E(+)$ in J/mol 1,000,000 $\exp(-E/RT)$
600	2.239E-09	3.169E-87
1500	3.468E-04	2.514E-35
2000	2.541E-03	1.123E-26
2500	8.395E-03	1.739E-21

Figure 9

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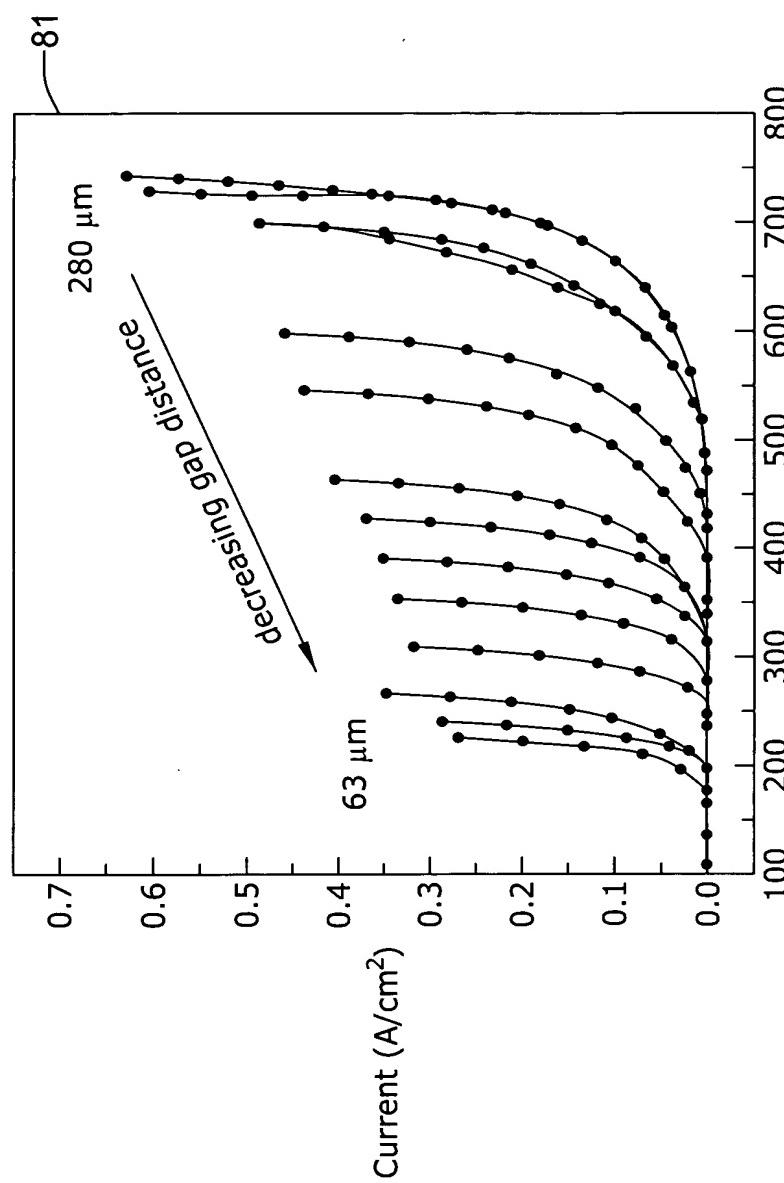


Figure 10

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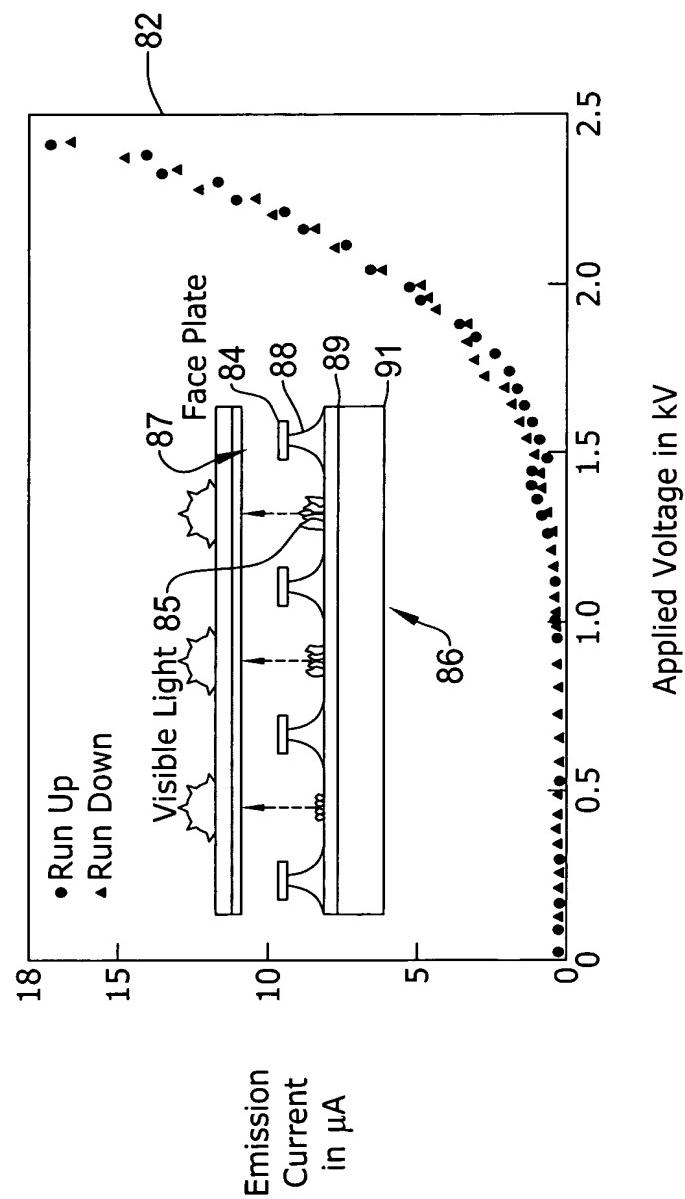


Figure 11A

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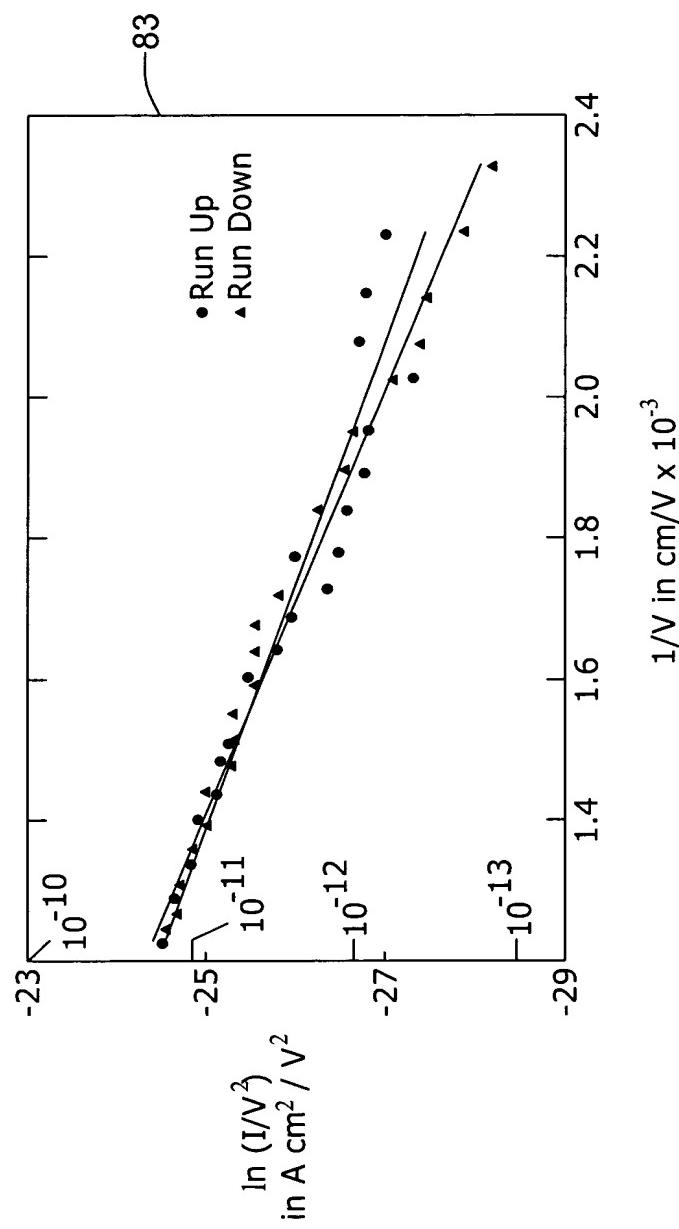


Figure 11B